

- » Brief overview of the science behind infrared breath testing and instrument functioning
- » Proper administration of the observation period
- » Operating the DataMaster DMT and ensuring testing validity
- » Common errors and conditions and proper responses
- » Practice scenarios
- » Hands-on practice tests



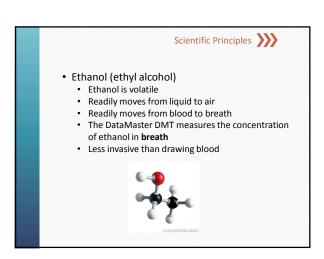
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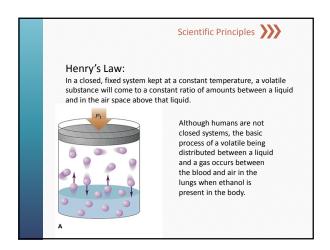


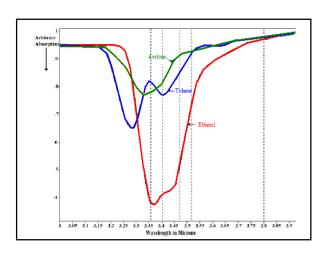
Why It Works— The Background Science

"To certify Vermont law enforcement officers in the proper operation of the DataMaster DMT and enable them to obtain a valid evidential breath sample

Objectives







Infrared Spectroscopy

IR energy is one small portion of the electromagnetic spectrum typically felt as heat.

In a molecule atoms are held together by bonds

When subjected to IR energy of the correct frequency the bonds will move from one vibrational state to the next highest

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When subjected to IR energy of the correct frequency the bonds will move from one vibrational state to the next highest

The Beer-Lambert law:
There is a direct relationship between the concentration of a substance and the amount of infrared energy it absorbs.

The DataMaster DMT can measure the amount of ethanol in a breath sample by detecting how much IR energy reaches the detector.

The more ethanol present in the breath, the more infrared energy is absorbed, the less IR energy that reaches the detector.

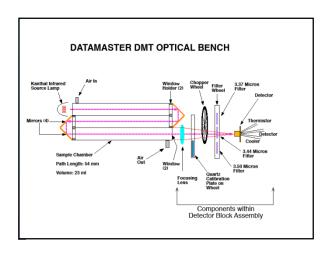
Infrared Spectroscopy

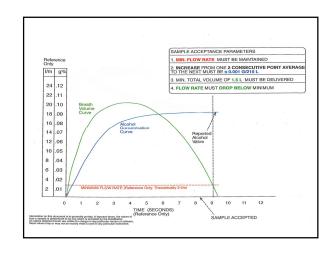
Different molecules absorb IR energy differently
The absorbance spectrum exhibited by each compound is also called a "fingerprint"

The "fingerprints" allow the DataMaster DMT to be specific for ethanol
The DataMaster DMT targets three specific wavelengths for ethanol

3.37 microns, 3.44 microns and 3.50 microns.

How It Works—
The Science of the
DataMaster DMT >





Instrument Analysis

• The DataMaster DMT is calibrated with a sample of known ethanol concentration

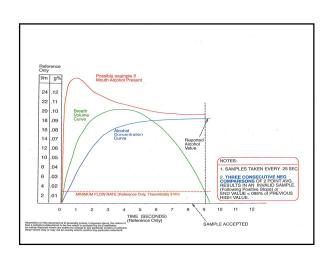
• Known concentration → known absorption

• IR energy absorbed by the KNOWN sample is compared to IR energy of UNKNOWN sample

• From this comparison the ethanol concentration of the unknown can be determined

Instrument Analysis, Proper Breath Samples • Mouth Alcohol is ethanol that is not a reflection of the ethanol in the blood. • Drinking or rinsing with alcohol—some remains in the mouth. Vomiting—if there is ethanol in the stomach, vomiting may leave mouth alcohol. Preventing Mouth Alcohol: 15 Minute Observation Period (nothing into the mouth, nothing out) · Most studies show that mouth alcohol dissipates within 10-12 minutes. **Detecting Mouth Alcohol:** The DMT will indicate if a negative slope is observed in the ethanol analysis curve.

Instrument Analysis, Proper Breath Samples >>>>
The DataMaster DMT is designed to sample deep lung air.
The human body is not a closed system.
The air in the bottom of the lungs will be closest in concentration to that found in the blood.
Air in the upper portion of the lungs is constantly being diluted by room air.
We want to sample the air closest to the blood, highest in concentration.



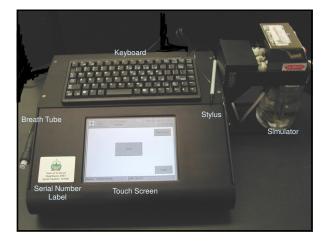
Instrument Analysis, Ethanol vs. Interferences



How would other substances be present?

- Diabetics and fasting people may produce acetone in their bodies in small amounts. (ketosis)
- Alcoholics have been known to ingest other alcohols besides ethanol.
 - Rubbing alcohol (Isopropanol), Wood alcohol (Methanol).
 - Both are very toxic to humans.
- Inhaling volatile substances which may remain on the

breath and absorb IR energy.

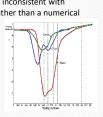


Instrument Analysis, Ethanol vs. Interferences



Different substances have different IR "fingerprints".

- The DataMaster DMT uses three filters at three different wavelengths to look for ethanol.
- Ethanol generates characteristic peaks at these wavelengths which differentiate it from other substances.
- If the DataMaster DMT detects a ratio inconsistent with ethanol it will report "Interference" rather than a numerical
- You will have to get a blood sample.



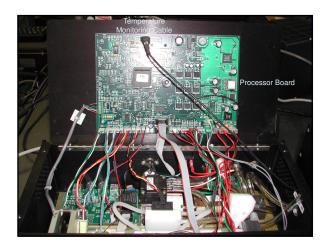








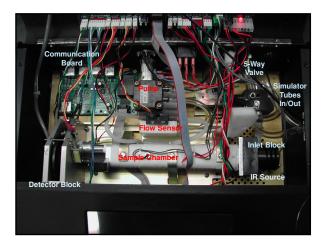
Operation of the DataMaster DMT



First Steps to Obtaining a Subject Sample



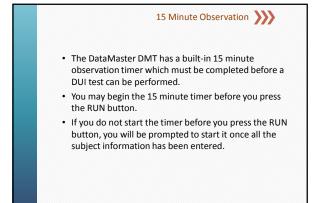
- · Clear the screen saver
- Ensure no error messages are present
- The bottom left of the screen should state "Ready" and flash "Push Run"
- If the DataMaster DMT does not indicate it is ready for use, go to another agency.

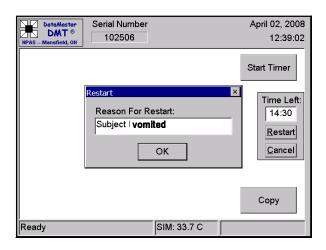


15 Minute Observation **\}**

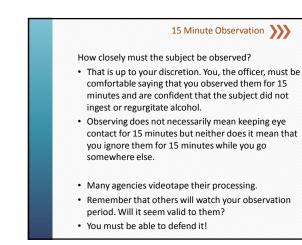


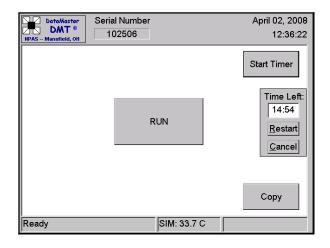
- · Check the subject's mouth for foreign objects
- DO NOT STICK YOUR FINGERS IN THEIR MOUTH
- Have the individual remove any foreign objects from
 - Tongue piercings and dentures are foreign objects
 - However, they do not need to be removed
 - Logan & Gullberg, 1997 found no effect from mouth jewelry
 - Harding, McMurray, Lassig, et al, 1993 found no effect from dentures or adhesives

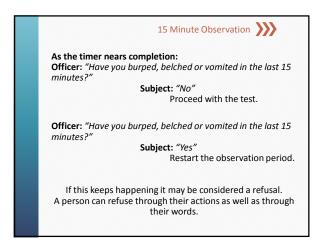


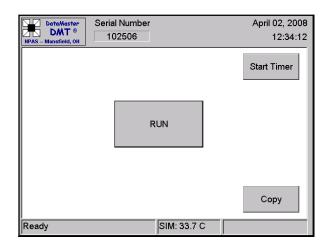


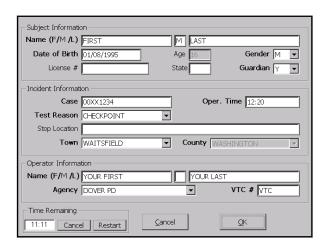
During the observation period nothing may go in to, or come out of the mouth The subject may not BURP, BELCH or VOMIT The timer may be restarted as many times as necessary. Each time the timer is restarted, a reason must be given. Each restart and the reason for the restart will be printed on the report.

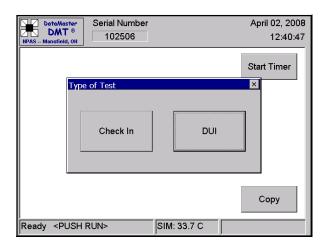


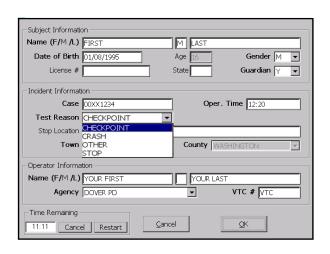




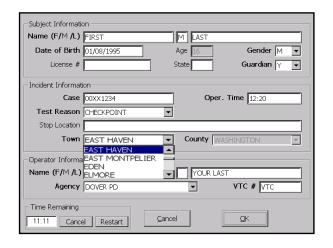


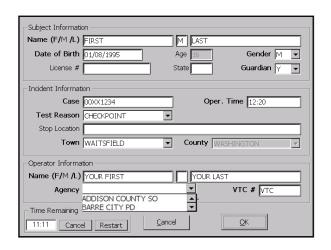






Types of Tests >>>
 For all suspected DUI subjects, you will select DUI
 If a subject fails a PBT during a Check-In and needs a confirmation test, select CHECK-IN
 Each selection will lead to a subject information entry screen.





Once all the subject information is entered, press OK to continue.
 A box will pop up which says "Review Data? Yes or No".
 Select Yes, this will bring you back to the data entry screen. Ensure that all of the information is correct.
 Press OK to continue. The "Review Data?" box will pop up again, this time select No.

Verify Data
Review Data?

Yes
No

Once you have entered and reviewed the data, the DMT will remain idle until the 15 minute timer is satisfied.

 If you did not start the timer before the data entry screen, a box will pop up saying "Start Timer?" Press OK to start the timer.

 The testing sequence is an automated process which will begin once both the timer is satisfied and the data is entered.

Ouality Control Checks

 The DMT analyzes a quartz plate for its Calibration Check.

 The calibration check is run to confirm the stability of the calibration.

 An acceptable result for the calibration check will display PASSED.

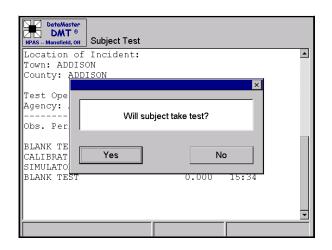
Quality Control Checks >>>

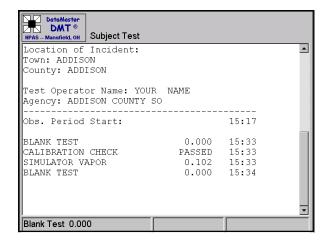
- An artificial breath sample is provided by the simulator and is analyzed as a control sample.
- This will be reported as the Simulator Vapor with a result indicated on all reports.
- A simulator solution at an approximate ethanol concentration of 0.100 is used.
- The DMT has an acceptance range of ± 5% of the certified value for the simulator vapor.
- The simulator temperature must also read 34.0°C ± 0.5°C.

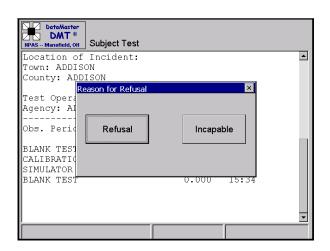
The instrument will prompt "Subject take test? Yes or No". If you press No, a box will pop up with two options, Refusal or Incapable. If the subject will not take the test, select Refusal. If the subject is physically incapable of providing a sufficient sample of air, select Incapable. In this instance, the subject may be offered an evidentiary blood test. Once you select Refusal or Incapable, another box will pop up asking for the reason. You may type in a reason why the subject did not take the test. All Refusals must be documented this way

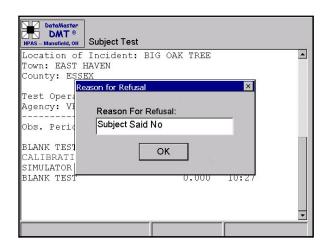
Purge
Ambient Zeroing
Blank Test ← 0.000
Calibration Check ← PASSED
Simulator Vapor ← ~0.100 ± 5%
Simulator Temperature ← 34.0°C ± 0.5°C
Purge
Ambient Zeroing
Blank Test ← 0.000

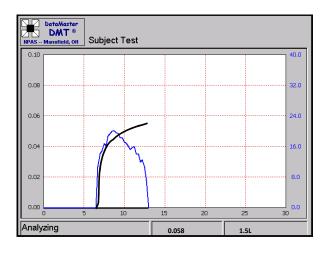
If any of the checks do not meet the requirements, the DMT is designed to stop the test sequence.











When the instrument prompts "Will subject take test? Yes or No".

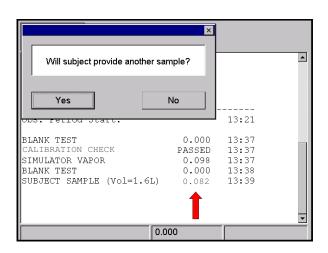
 Select Yes, the instrument will then flash "Please Blow" and an intermittent tone will be heard.

 Insert a new mouth piece into the breath tube.

 Instruct the subject to blow a slow, continuous breath.

Once an adequate sample is accepted, immediately remove the mouth piece from the breath tube.
 The instrument will then purge.
 Once the sample is analyzed, the DataMaster DMT will display the subject's breath ethanol concentration.
 The officer will inform the subject of their results and ask if they want a second test.
 The instrument will prompt "Will subject provide another sample? Yes or No".

As the subject meets the minimum flow rate, the tone will become constant.
The subject must provide a minimum of 1.5L of air. DO NOT tell the subject to stop blowing.
While the subject is blowing, you will be able to see the breath and ethanol curves in real time.



Instrument Operation >>>

- If No is selected, the test sequence ends.
- If Yes is selected, the instrument will again perform its quality control checks.

Purge

Ambient Zeroing

Blank Test

Calibration Check

Simulator Vapor

Purge

Ambient Zeroing

Blank Test

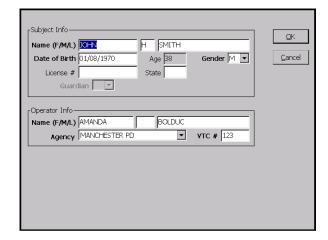
Check-In Test

- Select the CHECK-IN box from the "Type of Test" window
- Check the subject's mouth for foreign objects.
 - · Remember, dentures and tongue piercings are ok
- · Complete the data entry
- · Review the information

Instrument Operation



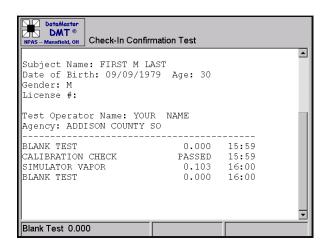
- · After the checks are complete the DataMaster DMT will again prompt "Will subject provide another sample? Yes or No".
 - If No is selected, the test sequence ends.
 - If Yes is selected, a second breath test may be given.
 - · The instrument will prompt "Please Blow" and the intermittent tone will be heard.
 - · Insert a new mouth piece into the breath tube.
 - · Instruct the subject to provide a second sample just as before.
 - Remember to remove the mouthpiece after sample delivery.
- Once the testing sequence is complete, three copies of the report will be printed.
- · Verify all information and results are correct.

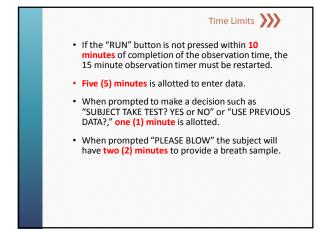


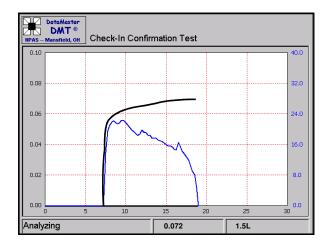
0.000 10:25 PASSED 10:25 0.056 10:25 0.000 10:30 0.000 10:31 All alcohol walness reported in q/2105. Sim. Vapor Concentration 0.160 Sim. Vapor Range 0.695 - 0.105 Let #: 13-13-200

The DataMaster DMT will perform a series of self checks. Once all the checks have passed, the DataMaster DMT will prompt "Please Blow". Insert a new mouth piece into the breath tube. Instruct the subject to provide a slow, continuous breath. An intermittent tone will be heard. As the subject meets the minimum flow rate, the tone will become constant.

Check-In Test

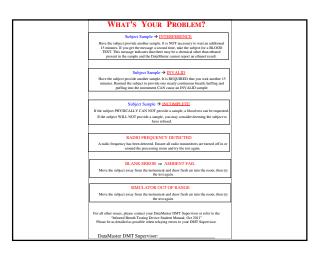






Atypical Results and Error Conditions)

Once the subject has finished delivering a satisfactory sample, immediately remove the mouth piece.
The Check-In report will print in triplicate.
See Page 40 in your student manual for an example.



Incomplete Sample >>>

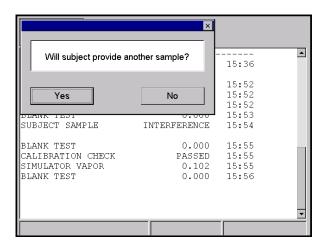
- If an adequate breath sample has not been provided in the two minute window the instrument will prompt "SUBJECT TAKE TEST? YES or NO".
 - Select "YES" to try again.
 - Select "NO" if the subject cannot or will not provide an adequate breath sample.
 - The instrument will then prompt "REFUSAL or INCAPABLE?"
 - Select "REFUSAL" or "INCAPABLE" as applicable and type a reason.

Interference >>>

- The ratio between the measurements at the three filters is not what is expected for ethanol. Another chemical may be present.
- INTERFERENCE will be displayed in place of a numerical result.
- When the instrument prompts "SUBJECT TAKE SECOND TEST? YES or NO" select "YES" and have subject provide another sample.
- If "INTERFERENCE" is reported again you may have the subject's blood drawn.

Incomplete Sample >>>

- After three failed attempts the instrument will rerun its quality control checks.
- The subject will then have three more chances to provide an adequate breath sample.
- Each failed two minute attempt will be documented on the report as INCOMPLETE.
- See Page 37 in your student manual for example.



Invalid Sample



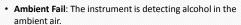
- An abnormal breath profile (decreasing ethanol concentration) has been obtained during sample
- The instrument will print a report documenting the INVALID sample and will return to the "Ready, Push Run" screen.
- · The testing sequence must be restarted including a new 15 minute observation period.
- See page 39 in your student manual for example.

Radio Frequency Detected



- The DataMaster is not immune to radio frequencies.
- If a transmission is detected, the testing sequence will be aborted.
- · Ensure there are no active transmitters in the processing area.

Ambient Fail / Blank Error



- · Blank Error: The instrument is unable to reach zero apparent alcohol.
- · For both of these errors:
 - · Remove the mouthpiece from the breath tube.
 - Remove possible contamination sources from the processing area.
 - Open windows or use a fan to draw fresh air into the room if possible.

Incorrect Date/Time **}**

- Incorrect Date
- **Incorrect Time**
- For both of these:
 - When the reports print, place a single line through the incorrect information and write in the correction on all three copies.
 - · Mark with your initials and date.
 - · Document the discrepancy on your processing

Notify your DataMaster DMT Supervisor if these conditions exist

Simulator Errors



- Simulator Out of Range: The simulator solution is outside the ± 5% acceptance range.
- Simulator Time Out: The simulator took too long to reach plateau while running a Simulator Vapor test.
- · For both errors, attempt the test again.

Printing Problems >>>



- Ensure the printer is loaded with ink and paper.
- Ensure the USB cable is connected to both the DataMaster DMT and the printer.
- Turn the DataMaster DMT off, ensure the printer is ready and free from errors, then turn the DataMaster DMT back on.
- · Press the COPY button to reprint reports.
 - The COPY button will reprint the last report generated, even if the DataMaster DMT is rebooted.
- · If, after several attempts, you are unable to get a readable report contact your DataMaster DMT Supervisor or DataMaster DMT Records Administrator. They have access to reprinting prior reports.

Other Common Errors >>>



- Pump Error: The flow detector does not detect pump operation or the pump speed is incorrect.
 - Ensure the breath tube is free from obstruction during a purge cycle.
- Suck Back Error: Air flow is in the reverse direction during a subject sample delivery.
 - Restart the testing sequence. When prompted to use previous timer and use previous data, select
 - Instruct the subject again on proper sample delivery.

April 02, 2008 Serial Number DataMaster 102506 12:34:12 Start Timer RUN Сору SIM: 33.7 C Ready

Error Conditions >>>

- · When receiving an error message it is permissible to retry the test. If the subsequent attempt results in a passing test, the subject's results are acceptable.
- DataMaster DMT Supervisors should be made aware of any and all errors.
- When encountering error messages that cannot be remedied, post "OUT OF SERVICE" on the DataMaster DMT and leave a detailed message for your DataMaster DMT Supervisor.
- All reports generated during a testing sequence including those displaying errors should be retained with the case

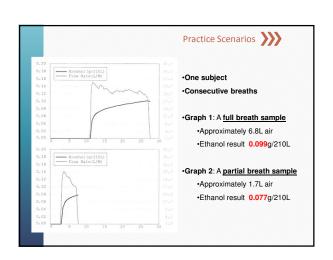
Practice Scenarios >>>>

- 2 Successful Tests with Results Like This:
 - Test 1: 0.119 Test 2: 0.138
- Vermont requires one (1) test. There are no requirements that the two tests be within any amount.
- There is human variability in giving a breath sample.
- Meeting minimum sample acceptance requirements vs. exceeding sample acceptance requirements.

Error Conditions



- 23 VSA 1202. d(5) A person who is requested by a law enforcement officer to submit to an evidentiary test administered with an infrared breath-testing instrument may elect to have a second infrared test administered immediately after receiving the results of the first test.
- If a subject requests a second breath test, get them a second test!
- If you have to go to another DMT, get TWO new tests!

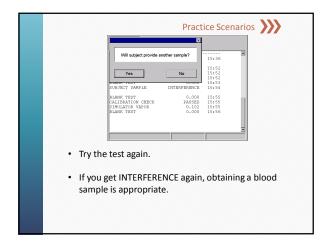


Practice Scenarios

Practice Scenarios >>>

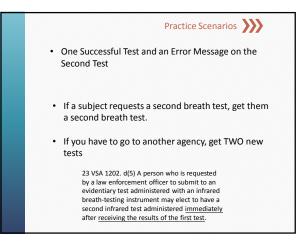


- Successful Test(s) with Result(s) <0.08 g/210L
- Continue with your processing.
- Submit a relation back request to the VFL.
- Remember: There are two types of DUI.
 - Per se >0.08
 - "Impaired to the slightest degree"



Prior to testifying, we recommend reviewing the questions located in the back of your Infrared Breath Testing Device Student Manual.

Testimony Preparation



Complete the following tests using the data below: Two 1-test DUI sequences Two 2-test DUI sequences · One Check-In Subject Name: (F) TEST (L) TEST 01/01/1991 Date of Birth: Gender: M or F Guardian Y or N 0000 Case: CURRENT TIME Stop Time: OTHER PITTSFORD Test Reason: Town: Operator Info: YOUR NAME Agency: YOUR AGENCY YOUR NUMBER Practice >

Complete and document the 15 minute observation period. Document, document, Keep all DMT printed reports (including those with error messages) together. 3 copies will print—one for you, one for the subject, and one for the State's Attorney If you get an error message, try the test again. If the next test is successful, that is an acceptable test. If you are not sure what to do, ask someone. On-Call State's Attorney, a supervisor, another experienced officer